

# Writing Research Proposals for NASA

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Writing proposals is a craft, but writing proposals for NASA might be considered a technological accomplishment. This poster will include some general principles for proposal writing, but will concentrate on specific guidelines that are necessary for writing and submitting successful proposals to NASA's Science Mission Directorate. ROSES will be featured.

## Who am I proposing to?

NASA is the premier funding agency for Earth and space science research

- ~\$600M annual Research and Analysis (R&A) budget with >50 R&A programs
- Each program has anywhere from \$1M-\$10M available each year
- Research also funded through operating missions

NASA's science research programs are managed by the Science Mission Directorate (SMD), which has 4 divisions:

- Earth Science
- Heliophysics
- Astrophysics
- Planetary Science

## Research Opportunities in Space and Earth Science

All NASA R&A funding is offered through the Research Opportunities in Space and Earth Science (ROSES) NASA Research Announcement (NRA)

ROSES is released annually and describes all SMD R&A opportunities

- NASA SMD R&A opportunities are organized into programs described in ROSES
- Each program is run by a scientist at HQ
- Overlap among programs is common, but each program has its own quirks

R&A programs come in different types and disciplines

## Types of R&A Programs

### Fundamental Research

- Basic research that extends our knowledge of fundamental processes and benefits current and future missions

### Instrument and Technology

- Intended to provide advanced lab equipment, develop instruments and technologies for future missions
- Competition is more intense and budgets are larger

### Data Analysis and Guest Investigator

- Research focused on using new or archived mission data
- Often attached to a single mission, sometimes short lived

### Participating Scientist

- Intended to broaden participation in mission science teams
- Unique opportunities that typically occur once per mission

### Others

- Theory, mission concept studies, fellowships, education and public outreach, history, policy, odd and unexpected stuff...

## ROSES-2009

### Summary of Solicitation (31 pages)

- Funding Opportunity Description
- Proposal and Submission Information
- NASA Strategic Objectives
- Lists of Solicited Programs

### Appendices

- A. Earth Science Research Programs (40)
- B. Heliophysics Research Programs (9)
- C. Planetary Science Research Programs (24)
- D. Astrophysics Research Programs (12)
- E. Cross-Division Research Programs (6)  
e.g. Applied Information Systems, E/PO  
(Total: 524 pages)

## ROSES-09—Astrophysics Programs

- D.1 Astrophysics Overview
- D.2 Astrophysics Data Analysis
- D.3 Astronomy and Physics Research and Analysis
- D.4 Astrophysics Theory
- D.5 GALEX Guest Investigator – Cycle 6
- D.6 Swift Guest Investigator – Cycle 6
- D.7 Suzaku Guest Observer – Cycle 5
- D.8 Fermi Guest Investigator – Cycle 3
- D.9 Kepler Guest Observer – Cycle 2
- D.10 MOST U.S. Guest Observer – Cycle 2
- D.11 Technology Development for Exoplanet Missions
- D.12 SPICA Science Investigation Concept Studies

- E.1 Cross Division Overview
- E.2 Applied Information Systems Research
- E.3 Origins of Solar Systems
- E.4 Opportunities in Education and Public Outreach for Earth and Space Science
- E.5 Supplemental Outreach Awards for ROSES Investigators
- E.6 Supplemental Education Awards for ROSES Investigators

## ROSES – Program Element Content

### 1. Program Scope

### 2. Programmatic Information

- Including evaluation criteria in addition to standard:
  - Intrinsic scientific and technical merit
- Relevance to NASA objectives
- Cost realism and reasonableness

### 3. Summary of Key Information

- Expected budget for new awards and average award size
- Maximum duration of awards
- Due dates
- Page length for the Science-Technical-Management section
- Web site for submission of proposal via NSPIRES
- NASA point of contact

## What NASA wants...

NASA is looking for two things from proposals:

- To fund research of high scientific quality
- Relies on Peer Review

To ensure the research will further NASA's objectives and verify the funds will be used properly

- Relies on Program Officer

*So there are two audiences reading your proposal*

Your job is to make it as easy as possible for these two audiences to select your proposal!

## What you should expect...

### What will NOT happen:

- You will not definitively answer the grand question plaguing the community
- You will not write a great piece of literature
- Your audience will not review your proposal in a quiet, uninterrupted setting
- Your audience will not be world experts on your topic
- Your audience will not accept your approach without question

### What WILL not happen:

- You will answer a focused, well-posed question of limited scope
- You will write a focused, no frills document
- Your audience will quickly review your proposal amid the chaos of their own life
- You will answer a focused, well-posed question of limited scope
- Your audience will be col-leagues from similar fields
- Your audience will be skeptical and critical

## What the Review Panel wants...

The Review Panel is primarily interested in the scientific merit of the proposal

### Why should the Review Panel care?

- Pick a compelling & appropriate topic of proper scope

### What's the point?

- Describe the objectives and end result of the work

### What are you doing?

- Describe your methodology and identify your assumptions
- Provide a detailed workplan describing who does what and when

### What are the weaknesses? Strengths?

- Scientific merit, relevance, cost
- Anticipate questions and answer them

### How does it all fit together?

- Logically link the objectives, methodology, and anticipated results to one another and to NASA's objectives

## What the Program Officer wants...

The Program Officer is primarily interested in the programmatic merit of the proposal

### Is this proposal appropriate for the program?

- Read the NRA and respond to it

### Does the proposal contain high quality science?

- Peer Review rating must be Good or higher

### Can the program afford it?

- Do not "super-size" the proposal
- Organize proposal into discrete tasks

### Does this proposal further NASA's objectives?

- Link proposal objectives to NASA objectives

### How will the money be spent?

- Provide a detailed budget with proper justifications

### Does the proposal contain all required information?

- Follow the Guidebook for Proposers!

## Where you should start...

### Guidebook for Proposers

- Available at NSPIRES website (<http://nspires.nasaprs.com>)
- Tells you what information the proposal needs to be selected
- Tells you how to present that information to make the job of the Review Panel and Program Officer easier

Never guess! Call the Program Officer for clarifications and questions

## Where you should start...

NASA standard requirements for all R&A proposals are given in the Guidebook for Proposers responding to NASA Research Announcements ("the Guidebook")

<http://www.hq.nasa.gov/office/procurement/nraguidebook/>

- 1. Overview of NASA Research Announcement (NRA)
- 2. Proposal Preparation and Organization
- 3. Proposal Submission Procedures

### Appendices

- A. Guide to Key documents on the World Wide Web
- B. Instructions for Responding to NASA Research Announcements (NASA Federal Acquisition Regulation Supplement)
- C. Proposal Processing, Review, and Selection
- D. Proposal Awards and Continued Support (Award Mechanics)
- E. Certifications, Sample Agreements, and Forms
- F. Frequently Asked Questions
- G. Security Requirements
- H. Process for Appeals

## The Guidebook - Section 2

### 2.1 Overview

### 2.2 Standard Proposal Style Formats

### 2.3 Proposal Contents

- NSPIRES/Grants.gov Cover Page
- Table of Contents
- Curriculum Vitae for PI and each Col
- Current and Pending Support
- Co-I and/or Collaborator Commitments
- Budget Justification
- Facilities and Equipment
- Summary of Personnel and Work Efforts
- Scientific/Technical/Management Section
- References and Citations
- Special Notification and/or Certifications
- Reprints/Preprints not allowed

## The Guidebook – Section 1.7

- Follow the instructions in the specific NRA element of interest

- Clearly state the objectives and implementation plan

- Provide appropriate recognition of preceding accomplishments, show how the proposed activity will extend and build on what has already been accomplished

- Proof read carefully and ask a colleague to critically review it

- Use legible fonts and illustrations and a clear, simple organization

- Strive for realism as well as adequacy of the budget and provide the details necessary to justify the proposed costs

## Suggestions: Before you start writing...

- Sit down, think through, and plan the research before writing the proposal

- Demonstrate the feasibility of the approach, especially if looking for something new or in a new way

- Stay focused—avoid "supersizing" the proposal

- Ignoring weaknesses will not make them go away; burying them with irrelevant details will not hide them

- Even though you give good DPS talks, you can't expect the review panel to remember those talks or give you credit for them. Review panel reviews the proposal, period

## Suggestions when you are writing

- Write clearly and simply—avoid hyperbole

- Organize the proposal well and follow the Guidebook for Proposers

- Provide the reader with clear signposts throughout the proposal

- Thoroughly review and cite the relevant literature

- Use graphics and tables effectively for impact

- If you are proposing multiple tasks, explain the interrelationship among them

- State if you are proposing the same research to two or more programs

## Typical Table of Contents

	1. Summary.....
	2. Scientific and Technical Approach.....
Specific to my proposal	2.1 Details of the Simulations.....
	2.2 Spatial & Time Structure of Planes.....
	2.3 Determine Thermal Plasma Loss.....
	2.3.1 Loss into LLE & Magnetosphere.....
	2.3.2 Loss into Polar Cap & Polar Cap.....
	3. Present State of Knowledge & Impact of Proposed Work.....
	4. Reference to NASA.....
	5. Management Approach.....
Specific to my proposal	5.1 Data Availability.....
	5.2 Personnel Responsibilities.....
	5.3 Leveraging.....
	References.....
	Facilities and Equipment.....
	Budget Justification Narrative.....
	PI and Co-I Biographical Sketches.....
	Statements of Commitment from Co-I and Collaborators.....
	Current & Pending Support.....
	Acronyms.....

## Well Structured and Articulate

### Summary

- Clear, concise, and complete overview (shorter the better)
- A summary graphic/figure/image can be useful
- Everybody's first impression
- Some people's only impression
- Value and context

### Scientific and Technical Approach

- Clear, focused, and targeted at achieving objectives
- Bullet points are valuable

### Present State of Knowledge & Impact of Proposal

- Summary of what the program/community will have at the end of the project
- Bullet points are valuable

## Well Structured and Articulate (2)

### Relevance to NASA

- What and how is it relevant to the solicitation your responding too

### Management Approach

- Leave no question that you can do what is proposed within the time and budget

### References

- Be fair and complete (those authors may be on the review panel)

### Budget Justification

- A high level overview narrative of what your budget contains
- Begins with a table of FTE/year per person
  - How the funds are to be distributed, travel to meetings, publication costs, etc.

### PI and Co-I Biographical Sketches

- MUST highlight what is relevant to the work proposed

### Current & Pending Support

- Provide the required information

## And don't forget to include

- Provide detailed budgets for all Co-Is, subcontractors, etc. with a narrative summary and justification

- Transparency: don't try to sneak things in the budget

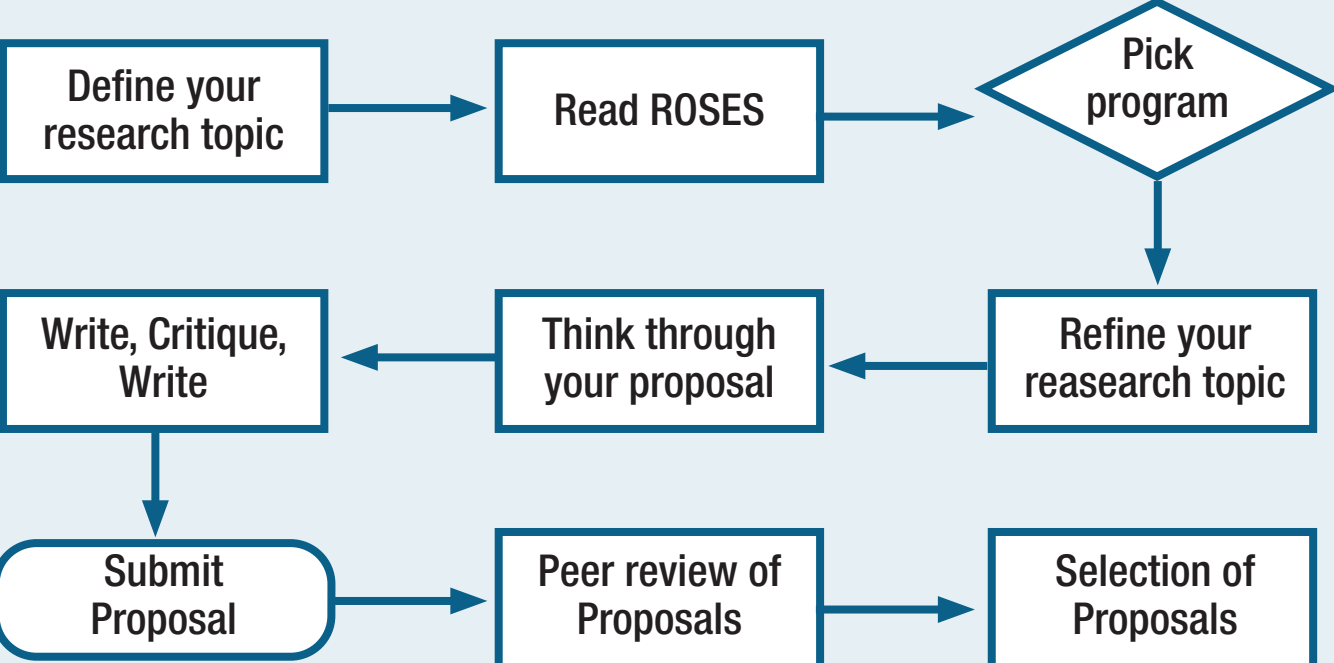
- Justify travel—why are those 4 conferences/year needed? Who is going?

- If the proposed research is related to research funded by or proposed to another program or agency, be exquisitely clear on which part of the research will be funded by each fund source

## At the end of the day you need to convince the panel that:

- The research is very important
- It is directly relevant to NASA's mission
- It is directly relevant to the solicitation
- Your proposed methodology is both feasible and appropriate
- You will deliver valuable results
- It is well worth the investment

## That's Where the Money is—How Do You Get It?



## Suggestions when you are selected

- Serve on a review panel
- Stay in touch with the Program Officer regarding funding receipt
- Submit your Progress Report on time
- Plan far ahead if you have a critical deadline for receipt of funds